

Nagios Monitoring System

- Specification -

Version 1.10



HÖFT & WESSEL

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1. Introduction

This document describes the specification of NAGIOS (Monitoring System) for Ticket Vending Machines. The monitoring system NAGIOS is a method, which can graphically display the status of an IT infrastructure. It can be flexibly applied to any requirement of a customer. The system is an Open Source Project and based on a UNIX environment (VMware installed on a windows based operating system). NAGIOS is accessible through a Web-Browser, therefore flexibly and unboundly usable. To monitor the devices you need the address, which is accessible about TCP/IP.

The following functions are offered:

- Optical alarms about the web interface, alternatively per speech-output SMS or email
- Definition of common reporting qualities in Reporting Classes
- Definition of dependent disturbances
- Adaptation to the needs of the customer (e.g. Service list)
- SNMP Messages can be displayed
- The whole IT-infrastructure can visualized with the Status map

2. Concept of the Monitoring System

2.1 Definition Error Messages about the status of a component

Error messages are displayed, if a status of a component reaches a defined limit. The error message informs, if the status changed to "Warning", "Critical" or "Normal/OK" and indicates the new status for the service or component.

Overview about the „Warning“-, „Critical“-, and „Normal/OK“ error messages:

- „Warning“ message: a message has reached a warning defined status
- „Critical“ message: a message has reached a critical defined status
- „Normal/OK“ message: a message has reached a normal defined status

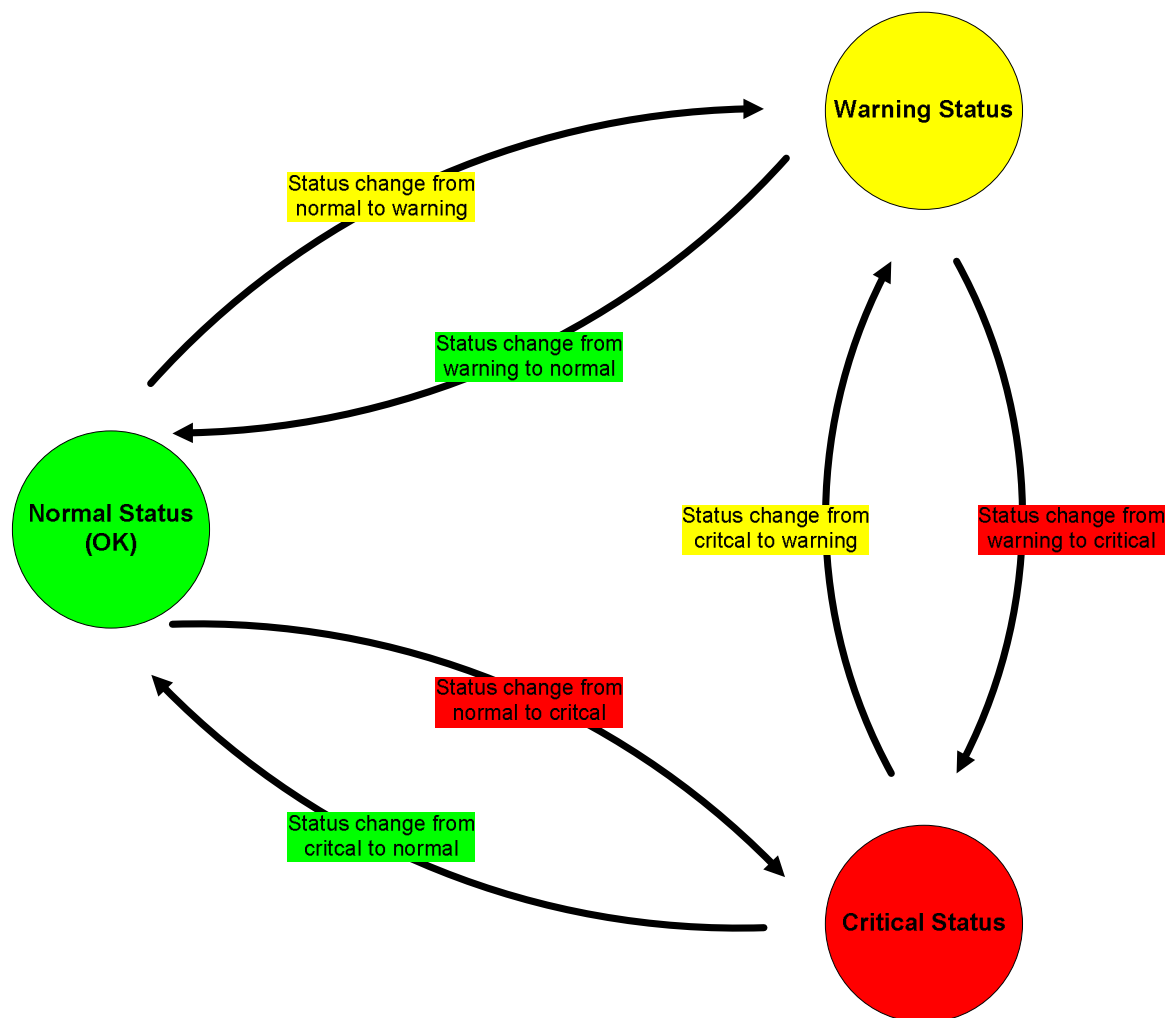


Abb. 1: Scheme „Warning“, „Critical“ and „Normal/OK“ messages

3. System requirements Server und Client

NAGIOS Server Hardware requirements:

Number of monitored devices	Number CPUs	CPU SPEED	Memory	Hard disk-capacity	Hard disk security	Network
<100	1	2GHz+	1GB	40 GB	Raid 5	100Mbit/1Gbit
100-200	1+	3GHz+	1GB	80 GB	Raid 5	100Mbit/1Gbit
>200	1+	3GHz+	2GB+	100 GB	Raid 5	100Mbit/1Gbit

The system requirement increases with the number of monitored devices and the services connected with that. Important for the system is the using of passive instead of active service checks in order to increase the system performance. When a UNIX-based system is tied on a Windows Operating System, virtualisation software must be provided as VMWARE.

Server requirements:

- 32bit operating system
- 4GB memory
- VMWARE Workstation Version 5.x or higher, alternative VMWARE Server Version 1.0.4 for UNIX-based virtual image of NAGIOS
- TCP/IP connection with 100 Mbit/1Gbit Ethernet access
- Raid 5 Array for hard disks

Client requirements:

- 32bit operating system
- Web browser like Internet Explorer, Firefox and so on
- TCP/IP via WALN, Ethernet or DSL with a 100Mbit access, lower Transfer rates are supported, but this decrease the performance of the displayed data

4. Dataflow between NAGIOS and TVM devices

4.1 Transmission of the SNMP status information

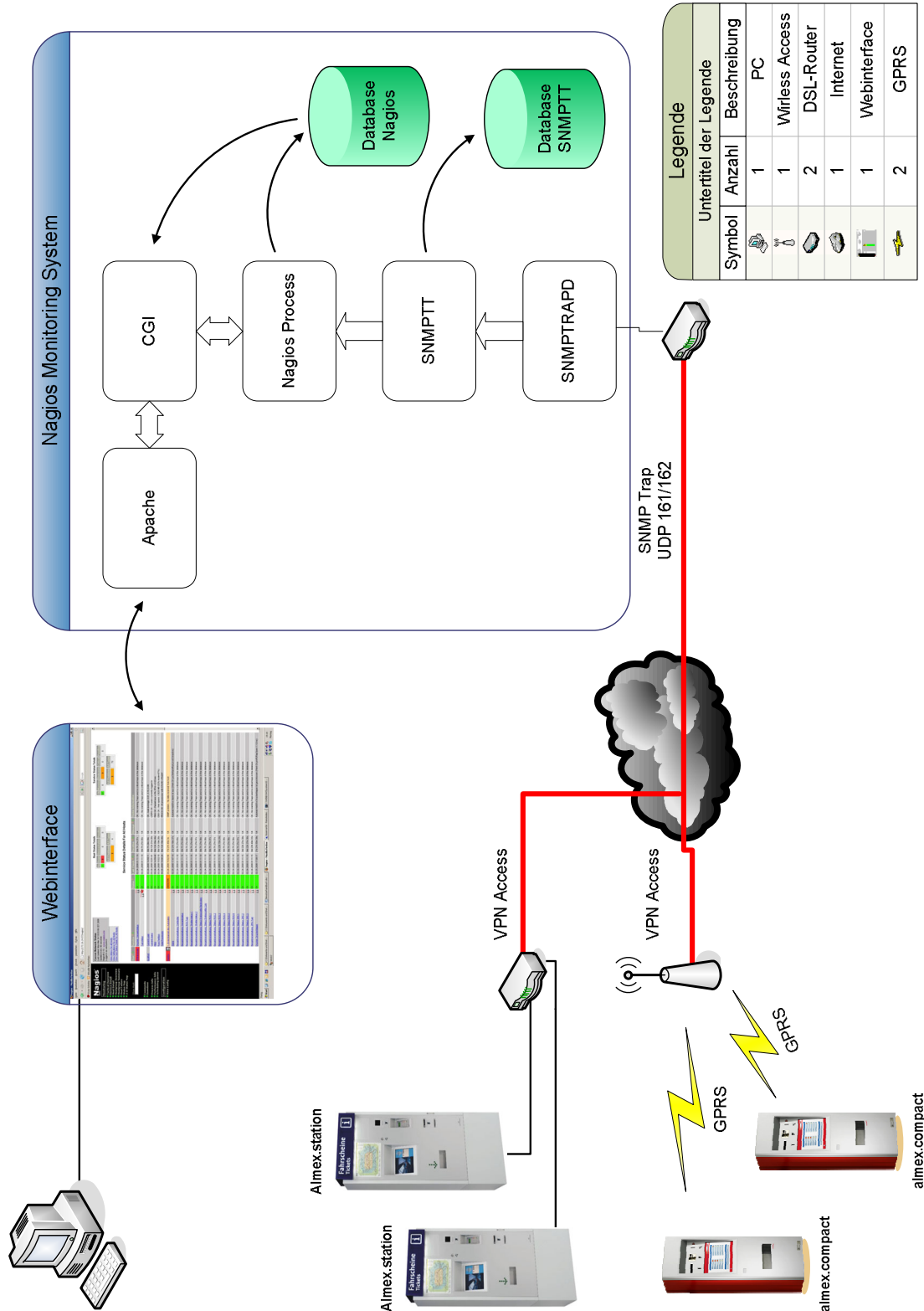


Abb. 2: Transmission of the status information

5. Authentication and Authorisation

5.1 Web Authentication

The user can reach the web interface over a standard browser, e.g. Internet Explorer, Firefox, Opera etc.). It is important to know the DNS-Name or the IP-Address of the Monitoring System.

- e.g. <http://sm-xyz/nagios/>
- e.g. <http://10.10.10.10/nagios/>

Access to the web interface is obtained by entering the correct username and password.



Abb.3: Screenshot Web authentication

It is possible to configure user rights for the web interface, e.g. administrator accounts, limited rights or guest accounts. In every level, the user gets information about the devices. In addition, user accounts with individual rights can be created.

5.2 Authorisation

Within the monitoring system an administrator, user or technician can be assigned to a particular device, device group and to the related monitoring services. Only for him certain information is displayed. The administrator of the monitoring system can see all devices with the service information. A user can therefore see only the information of a device to which he is assigned. Moreover, he alone is informed about this device at appearing disturbances.

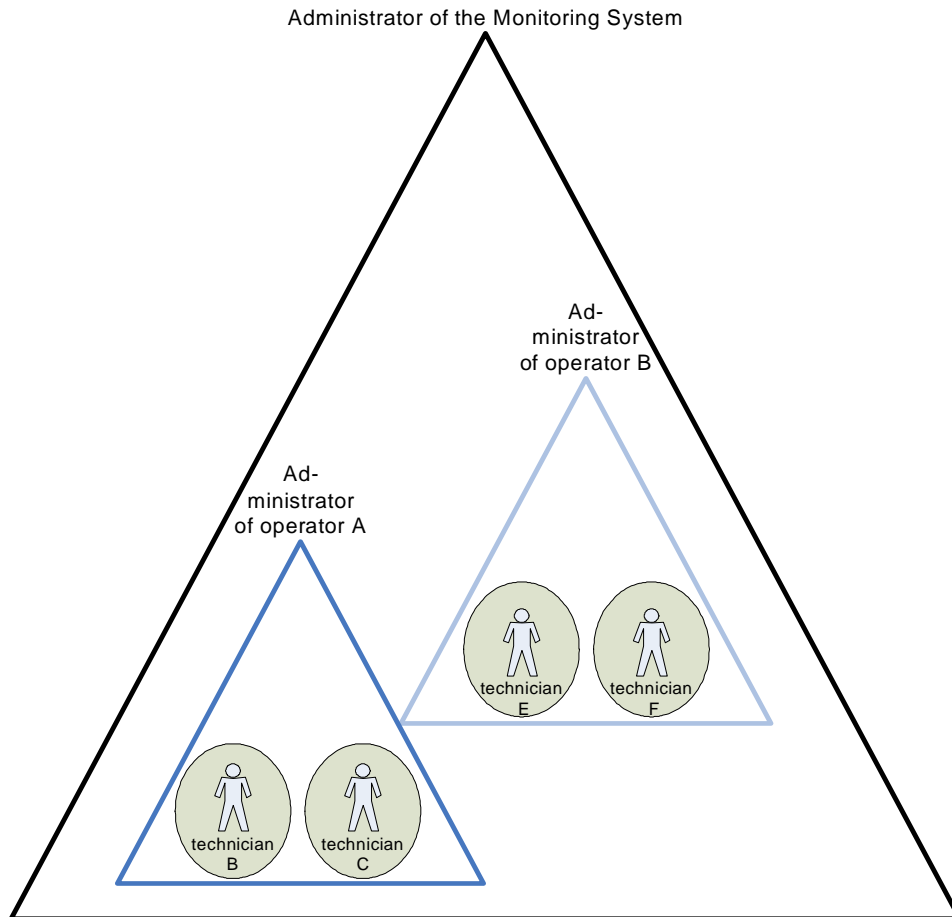


Abb.3: authorisation overview

6. Web Interface

6.1 The construction of the web interface

6.1.1 Tactical Overview

Information about the monitoring system is shown to the Tactical Overview on the first side, e.g. how many error messages are configured or is now a service in a critical status.

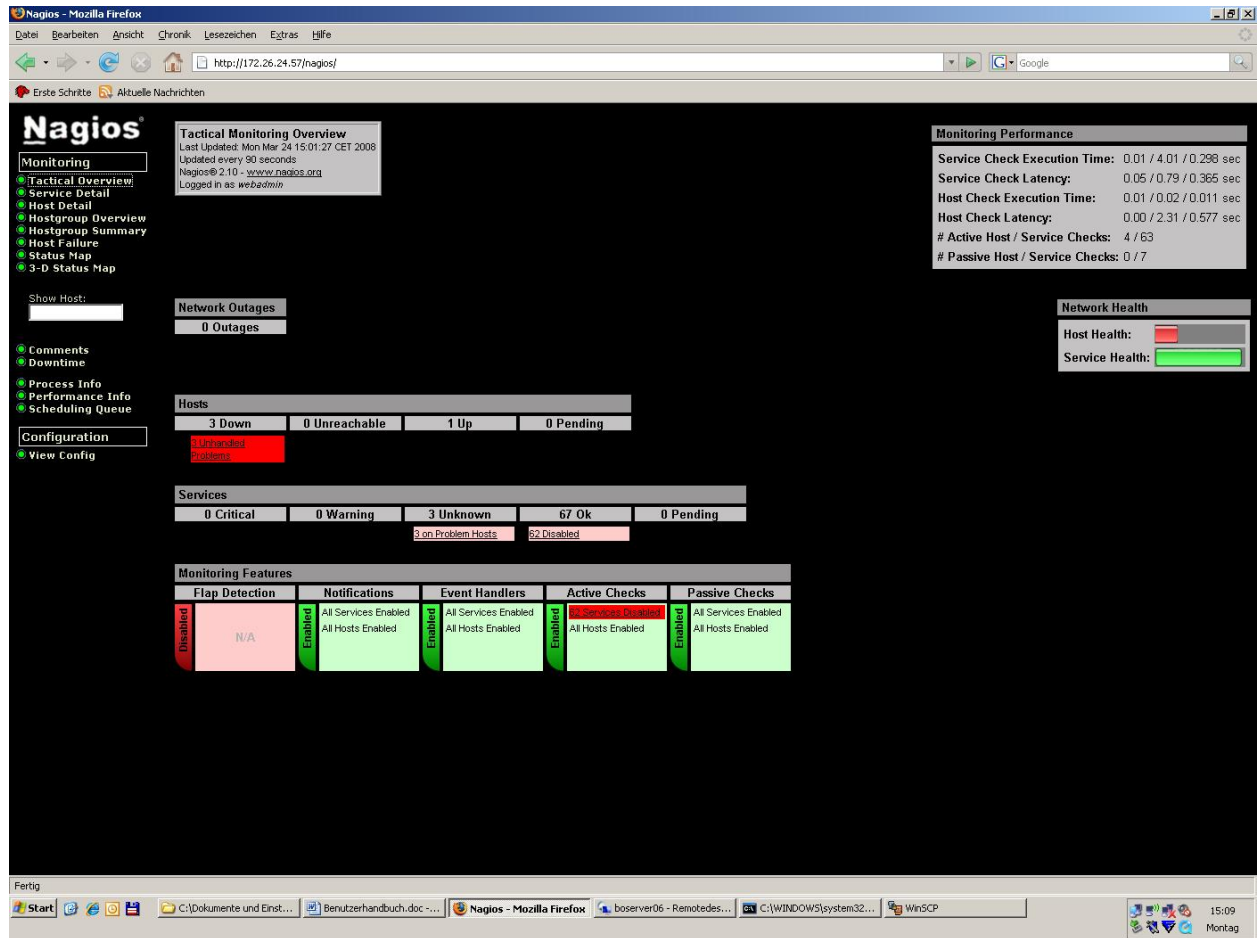


Abb.5: Screenshot Tactical Overview

6.1.2 Host Failure

All disturbances which are active at the moment and were passed on to the monitoring system are announced at the Host Failure side. On this side only the error status of services, e.g. Unknown, Critical or Warning are shown. If one of the services is changing from a critical to a normal status, the information will be deleted from this page.

The screenshot shows the Nagios web interface in a Mozilla Firefox browser. The main content area is titled "Service Status Details For All Hosts" and displays a table of service status information. The table is sorted by service status in descending order. The table contains three entries, all with a status of "UNKNOWN".

Host	Service	Status	Last Check	Duration	Attempt	Status Information
mid01a	1. Erreichbarkeit des Automaten	UNKNOWN	03-24-2008 15:07:56	17d 21h 50m 51s	1/4	SNMP problem - No data received from host
mid02c	ping	UNKNOWN	03-24-2008 15:06:03	17d 21h 52m 44s	1/4	check_ping: Invalid hostname/address - rrb001e.huwag.net
mid02c	1. Erreichbarkeit des Automaten	UNKNOWN	03-24-2008 15:08:33	27d 1h 1m 5s	1/4	SNMP problem - No data received from host

Below the table, it indicates "3 Matching Service Entries Displayed". The left sidebar contains navigation options under "Monitoring" and "Configuration". The bottom of the screenshot shows the Windows taskbar with the time 15:16 on Montag.

Abb.6: Host Failure View

6.1.3 Service List

The detailed service list shows all monitored services to this one which are assigned to a single host (machine). A distinction is made between active and passive review of services. An active service query would be a query after a particular time which would be repeated after expiry of the interval again and again. This leads to increased net expense for a rising service number and too considerable performance. The service monitoring about passive service queries represents a better method for NAGIOS, because it is based on a thorough change in status of the devices responding and the status of the service is updated and displayed.

Host Status Totals

Up	Down	Unreachable	Pending
1	3	0	0

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
87	0	3	0	0

Service Status Details For All Hosts

Host	Service	Status	Last Check	Duration	Attempt	Status Information
rhd01e	Drucker_Gesamtstatus	OK	02-24-2008 01:11:19	30d 7h 27m 37s	1/4	OK - No warning Traps and no critical traps in the database
	Tuerstatus	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
localhost	Current Load	OK	03-24-2008 14:59:11	30d 7h 24m 39s	1/4	OK - load average: 0.01, 0.10, 0.08
	Current Users	OK	03-24-2008 15:01:41	56d 12h 21m 26s	1/4	USERS OK - 0 users currently logged in
rhd01e	1_Erreichbarkeit des Automaten	UNKNOWN	03-24-2008 15:02:56	17d 21h 45m 3s	1/4	SNMP problem - No data received from host
	Alarm	OK	02-25-2008 17:47:19	27d 21h 18m 37s	1/4	Automat rhd01e Alarm ist aus (Wert:OK psCMAAlarmRunLevel.0.inactive)
rhd01e	Bargeldverarbeitung_Cointester	OK	02-24-2008 01:11:16	30d 7h 27m 40s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Gesamtstatus	OK	02-24-2008 01:11:16	30d 7h 27m 40s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_RGS-Tuer	OK	02-24-2008 01:11:17	30d 7h 27m 40s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Schutterstatus_1	OK	02-24-2008 01:11:16	30d 7h 27m 40s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Schutterstatus_2	OK	02-24-2008 01:11:19	30d 7h 27m 37s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status Endkassette Banknoten	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status Endkassette Coin	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 1	OK	02-24-2008 01:11:19	30d 7h 27m 37s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 2	OK	02-24-2008 01:11:19	30d 7h 27m 37s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 3	OK	02-24-2008 01:11:15	34d 23h 15m 24s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 4	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 5	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status RGS 6	OK	02-24-2008 01:11:18	30d 7h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status ZRS 1	OK	02-24-2008 01:11:19	30d 7h 27m 37s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status ZRS 2	OK	02-24-2008 01:11:15	34d 22h 27m 38s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_Status ZRS 3	OK	02-24-2008 01:11:15	34d 22h 27m 30s	1/4	OK - No warning Traps and no critical traps in the database
	Bargeldverarbeitung_ZRS-Tuer	OK	02-24-2008 01:11:15	34d 23h 49m 33s	1/4	OK - No warning Traps and no critical traps in the database
	Drucker_Druckerklappe	OK	02-25-2008 17:08:17	27d 21h 55m 39s	1/4	Automat rhd01e Druckerklappe ist geschlossen (Wert:Ok prnPUPlapOpen.1.1.0.no)

Abb.7: Service List

6.1.4 Device Overview

In this view all monitored terminals are displayed and the current complete condition of the device is represented.

Current Network Status
 Last Updated: Mon Mar 24 15:06:59 CET 2008
 Updated every 90 seconds
 Nagios® 2.10 - www.nagios.org
 Logged in as: *webadmin*

Host Status Totals

Up	Down	Unreachable	Pending
1	3	0	0

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
67	0	3	0	0

Host Status Details For All Host Groups

Host	Status	Last Check	Duration	Status Information
Wftrafserver	DOWN	02-24-2008 01:11:20	53d 1h 16m 19s	CRITICAL - Network Unreachable (192.168.1.1)
beahost	UP	02-23-2008 07:38:20	56d 12h 25m 28s	PING OK - Packet loss = 0%, RTA = 0.02 ms
ip001a	DOWN	03-24-2008 15:06:03	17d 21h 49m 51s	SNMP problem - No data received from host
ip001e	DOWN	03-24-2008 15:03:33	33d 2h 16m 23s	SNMP problem - No data received from host

4 Matching Host Entries Displayed

Abb.8: Device Overview

6.1.5 Group overview of Devices

Devices can be linked to logical groups, which are represented in tabularly form here. Here, in summary, the monitored services to a device and the allocated sum of the services which are in a status OK, Warning status and Critical status.

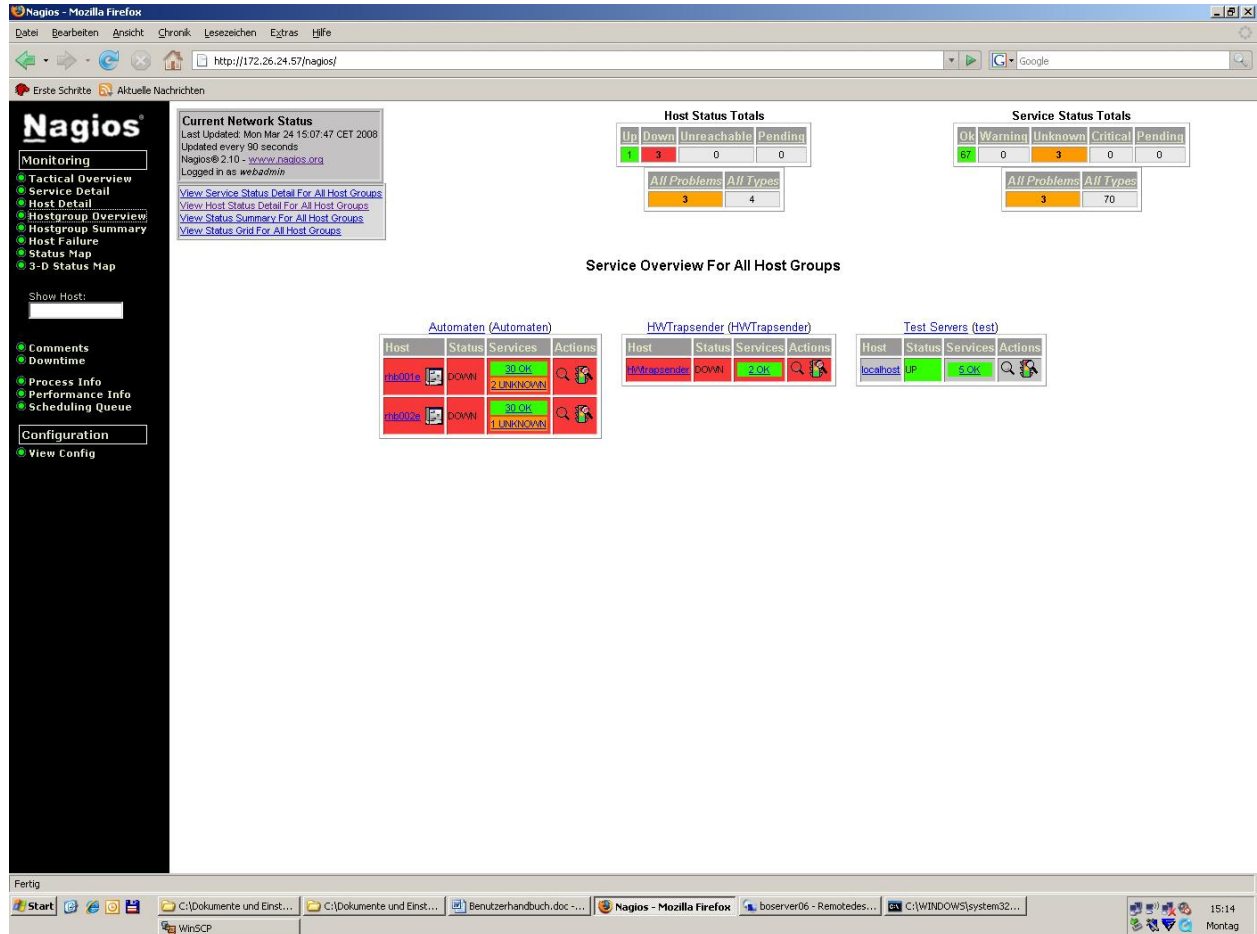


Abb.9: Groupoverview of devices

6.1.6 Status map of devices

The status map provides a graphical visualisation of the configured network infrastructure, in which additionally existing dependencies can be represented. By dependencies, additional error messages can be prevented, e.g. if devices are on a network coupling element of the corporate network - this is the bottleneck. If this component is cancelled, every dependent device would therefore be reported as disturbed at active service checks. This can lead to an undesired flood of error messages.

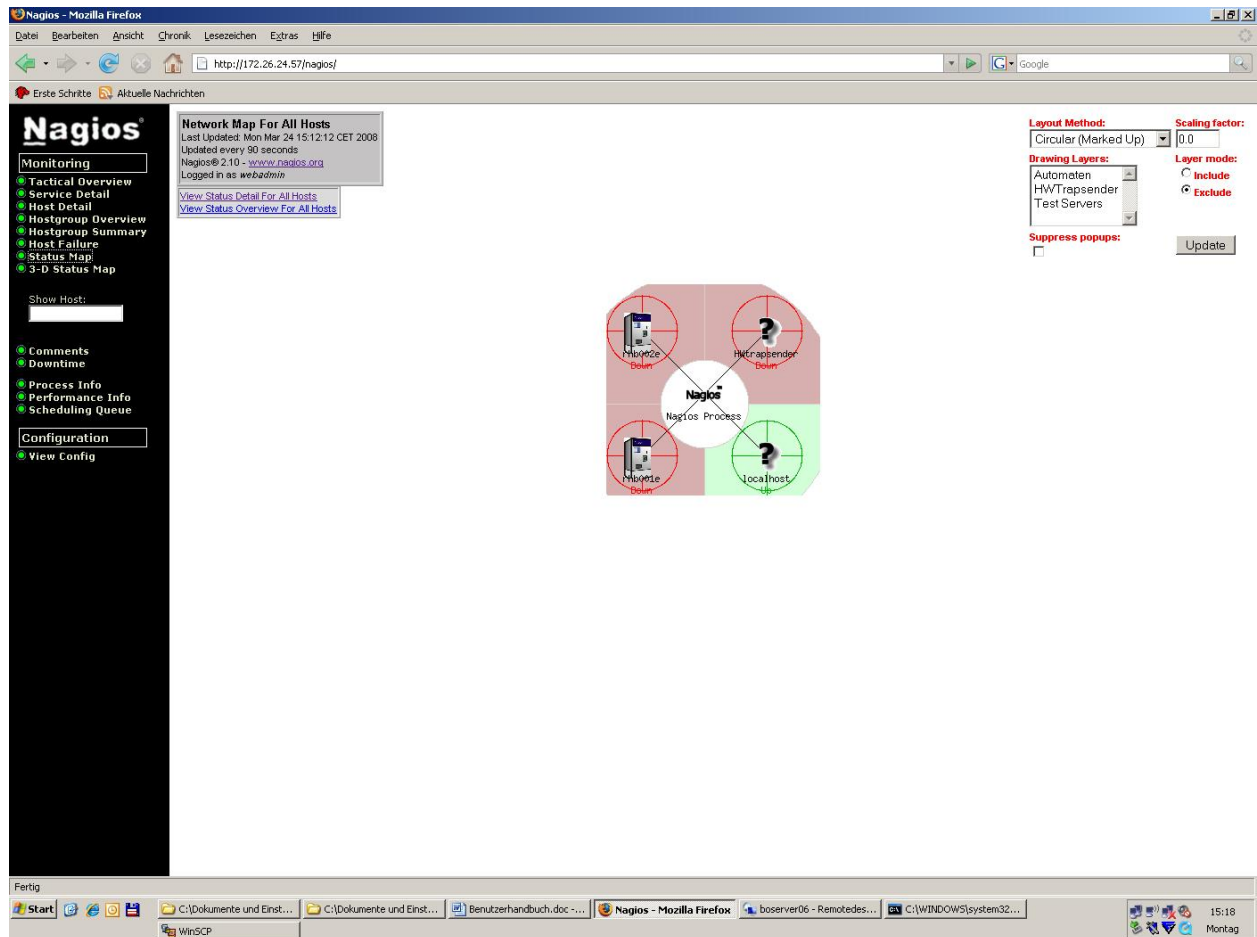


Abb.10: Status map

7. The notification system

7.1 Notification by email

The monitoring system with a configured contact, can be warned at critical status or warning status warned. The status change will automatically be informed and then forwarded by mail. After a specifically defined time interval the system informs the responsible person once more.

7.2 Notification by SMS

The responsible person is informed about an appearing disturbance of the device by SMS. A GSM USB module with a SIM card is needed.. This module is attached to the physical monitoring system and mounted over the virtual machine. The message is created by the monitoring system and send to the relevant contact person.

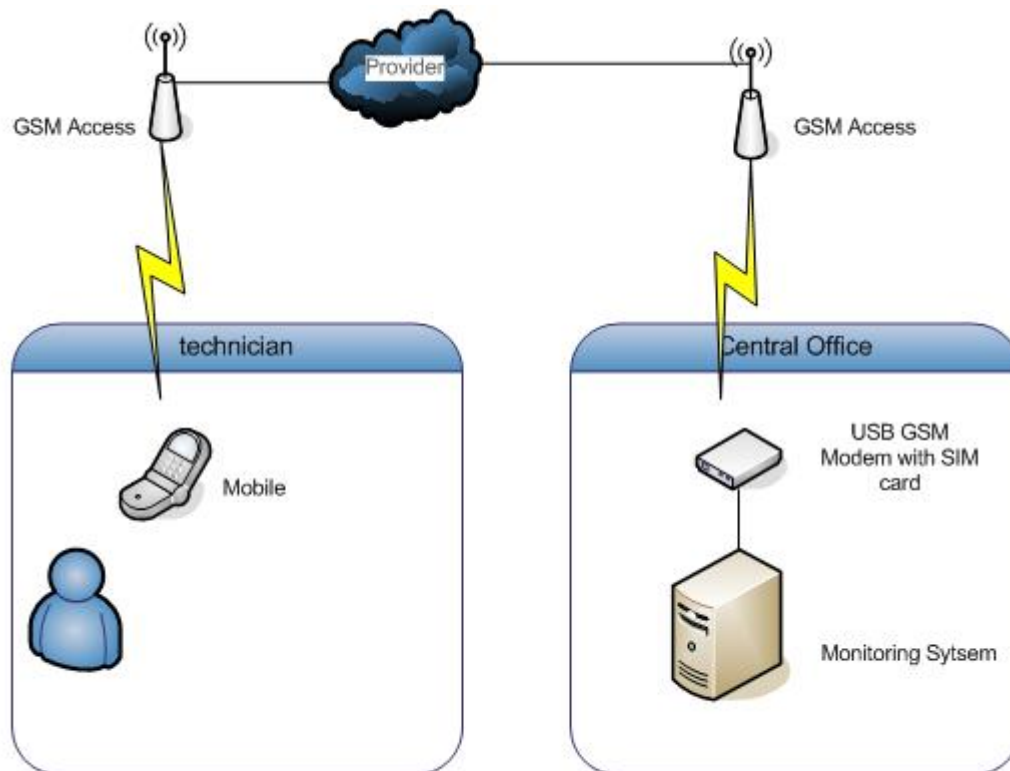


Abb.11: SMS notification

8. Tabular List of Error Messages

All configured error messages are listed in this overview.

8.1 Printer

8.1.1 Printer Operating Status

DPE	OID	Normalstatus	Error
operatingstate.status	1.3.6.1.4.1.15478.1.1.2.1.2.1.0	„Printer OK“	„Printer Failure“

Dependencies:

Cutting unit
Print head
Paper tray

8.1.2 Status of the cutter

DPE	OID	Normalstatus	Error
printer1.cuttingunits.cuttingunit1.prnCustatus	1.3.6.1.4.1.15478.1.1.3.1.3.1.1.0	„Cutting Unit OK“	„Cutting Unit Failure“

1 Printer (Device is out of order) 2 Printer Device change the printer (Device is in order)	Error messages: Printer Cutting Unit Failure Printer Operating Status Failure
--	--

8.1.3 Status of Printing Unit

DPE	OID	Normalstatus	Error
printingunits.printingunit1.status	1.3.6.1.4.1.15478.1.1.4.1.3.1.1.0	„Printing Unit OK“	„Printing Unit Failure“

8.1.4 Status of Paper Cartridges

DPE	OID	Normalstatus	Error
printer1.papercartridges.cartridge1.status	1.3.6.1.4.1.15478.1.1.8.1.3.1.1.0	„PaperCartridge1 OK“	„ PaperCartridge1 Failure“
printer1.papercartridges.cartridge2.status	1.3.6.1.4.1.15478.1.1.8.1.3.1.2.0	„PaperCartridge2 OK“	„ PaperCartridge2 Failure“

1 Printer (Device is out of order) 2 Printer Device change the printer (Device is in order)	Error messages: Printer PaperCartridge1/2 Failure Printer Operating Status Failure
--	---

8.1.5 Paper Cartridge Level

DPE	OID	Value > 10%	0% < Value <= 10%	0%
printer1.papercartridges.cartridge1.level.status	1.3.6.1.4.1.15478.1.1.8.1.9.1.1.0	„OK“	„low“	„empty“
printer1.papercartridges.cartridge2.level.status	1.3.6.1.4.1.15478.1.1.8.1.9.1.2.0	„OK“	„low“	„empty“

8.1.6 Status Printer Flap

DPE	OID	Normalstatus	Error
printer.printer1.printingunits.printingunit1.flap.status	1.3.6.1.4.1.15478.1.1.4.1.9.1.1.0	„Printer Flap closed“	„Printer Flap opened“

<p>1 Printer (Device is out of order) 2 Printer Device change the printer (Device is in order)</p>	<p>Error messages: Printer Printer Flap opened Printer Operating Status Failure</p>
--	--

8.2 Power Supply

8.2.1 Power Supply Operating Status

DPE	OID	Normalstatus	Error
Powersupply.operatingstate.status	1.3.6.1.4.1.15478.1.2.2.1.0	„OK“	„Failure“

Dependencies:
Blackout Shutdown Power Supply
Case Monitoring
Alarm, Bulgaria

8.2.2 Blackout Shutdown Power Supply

DPE	OID	Normalstatus	Error
powersupply.operatingstate.blackoutshutdown	1.3.6.1.4.1.15478.1.2.2.7.0	„Powersupply OK“	„Powersupply Failure“

8.2.3 Battery Charging

8.2.4 Case Monitoring Door Status

DPE	OID	Normalstatus	Error
powersupply.casemonitoring.door.status	1.3.6.1.4.1.15478.1.2.8.5.1.0	„OK“	„Failure“

8.2.5 Case Monitoring Door Open

DPE	OID	Normalstatus	Error
powersupply.casemonitoring.door.open	1.3.6.1.1.4.1.15478.1.2.8.5.4.0	„Door closed“	„Door opened“

Dependencies: -	Error messages: Door open
---------------------------	-------------------------------------

8.2.6 Bulgaria Monitoring (Status Alarm, Bulgaria)

DPE	OID	Normalstatus	Error
powersupply.casemonitoring.alarm.status	1.3.6.1.4.1.15478.1.2.8.7.1.0	„OK“	„Failure“

DPE	OID	Normalstatus	Error
powersupply.casemonitoring.alarm.burglary	1.3.6.1.4.1.15478.1.2.8.7.5.0	„Alarm inactive“	„Bulgary“

8.3 Cash Processing

8.3.1 Cash Processing Operating Status

DPE	OID	Normalstatus	Error
cashprocessing.operatingstate.status	1.3.6.1.4.1.15478.1.4.2.1.0	„Cash processing OK“	„Cash processing Failure“

Dependencies:

Shutter Unit („Shutter“)
 Cointester
 Rack Doors Cash Cartridges
 ZRS (Hopper)
 RGS

8.3.2 Shutter Unit (Shutter 1 und 2)

DPE N = [1,2]	OID	Normalstatus	Error
cashprocessing.coinslot.shutter.shutterN.status	1.3.6.1.4.1.15478.1.4.5.1.1.2.N.0	„ShutterN Unit OK“	„ShutterN Unit Failure“

-	<p><u>Error messages:</u> Cointester: Failure Cash processing: Failure</p>
---	--

8.3.3 Coin Tester

DPE	OID	Normalstatus	Error
cashprocessing.cointester.status	1.3.6.1.4.1.15478.1.4.6.1.0	„OK“	„Failure“

-	<p><u>Error messages:</u> Cointester: Failure Cash processing: Failure</p>
---	--

8.3.4 Rack Doors Cash Cartridges

DPE	OID	Normalstatus	Error
cashprocessing.rackmonitoring.doors.cashcartridges.open	1.3.6.1.4.1.15478.1.4.7.1.1.5.2.0	„closed“	„opened“
cashprocessing.rackmonitoring.doors.hopper.open	1.3.6.1.4.1.15478.1.4.7.1.1.5.2.0	„closed“	„opened“

-	<p><u>Errormessages</u> Rack Doors Cash: opened Cash processing: Failure</p>
---	--

8.3.5 Coin Cartridge (RGS) 1 to 6

DPE N = [1,2,3,4,5,6]	OID	Normalstatus	Error
cashprocessing.cash.cashcontainer.coincartridges.cartridgeN.status	1.3.6.1.4.1.15478.1.4.10.2.1.1.2.N.0	„RGS OK“	„RGS Failure“

-	<p><u>Error messages:</u> Coin Cartridge N: Failure</p>
---	--

8.3.6 Cash Container Hopper (ZRS) 1 to 3

DPE N = [1,2,3]	OID	Normalstatus	Error
Cashprocessing cash.cashcontainer.hopper.hopperN.status	1.3.6.1.4.1.15478.1.4.10.1.1.1.2.N.0	„ZRS OK“	„ZRS Failure“

-	Error messages: Cash Container Hopper N: Failure
---	--

8.3.7 Coin Cash Boxes (MEK)

DPE	OID	Normalstatus	Error
cash.cashcontainer.coincashboxes.coincashbox1.status	1.3.6.1.4.1.15478.1.4.10.3.1.1.2.1.0	„OK“	„Failure“

-	Error messages: Coin Cash Box N: Failure Cash processing: Failure
---	--

8.3.8 Note Cash Boxes (MEK)

DPE	OID	Normalstatus	Error
cash.cashcontainer.notecashboxes.notecashbox1.status	1.3.6.1.4.1.15478.1.4.10.4.1.1.2.1.0	„OK“	„Failure“

TVM use only coins, notes are not accepted	Error messages: Note Cash Box N: Failure Cash processing: OK
--	---

8.4 Card Reader

8.4.1 Card Reader Operating state

DPE	OID	Normalstatus	Error
cardreader.operatingstate.status	1.3.6.1.4.1.15478.1.3.6.1.0	„Card reader OK“	„Card reader Failure“

-	Error messages: Card Reader: Failure
---	--